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UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36362

STEBG-TD

1 APR 1964

SUBJECT: Report of Test, USATECOM Project No. 4-4-4290-01
Product Improvement Test of AN/ASW-12 Improved
Roll-Axis Calibration Unit for Automatic Flight Control
System in OV-1 Aircraft.

TO: Commanding General
US Army Electronics Command
ATTN: AMSEL-AV-F
Fort Monmouth, New Jersey

11 Apr 64

12/5P.

1. References.

a. Letter, SELRA /SRI 1G6 41203 D 527 02, US Army Electronics Research and Development Laboratory, 12 August 1963, subject: "Flight Test of Improved Roll Axis Calibration Setting for OV-1 Aircraft," with 1st Indorsement, AMSEL-AV-F, US Army Electronics Command, 19 August 1963.

b. Plan of Test, USATECOM Project No. 4-4-4290-01-G, "Product Improvement Test of AN/ASW-12 Improved Roll-Axis Calibration Unit for Automatic Flight Control System in OV-1 Aircraft," US Army Aviation Test Board, 26 November 1963.

2. Authority.

a. Directive. Letter, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 5 September 1963, subject: "Directive for Product Improvement Test of AN/ASW-12 Improved Roll-Axis Calibration Setting for Automatic Flight Control System in OV-1 Aircraft."

b. Purpose. To determine suitability of the new roll-axis calibration unit for the AN/ASW-12(V) Automatic Flight Control System (AFCS) for use in OV-1B and other OV-1 airplanes.

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3. Background.

a. Product improvements (i.e., larger engines and increase in wing area) of the OV-1B Airplane configuration have resulted in a requirement for new roll-axis calibration settings for the AN/ASW-12(V) AFCS (reference a). The US Army Electronics Research and Development Laboratory (USAELRDL) conducted preliminary flight test of the new roll-axis calibration setting and found considerable improvement over the setting presently in use. The US Army Electronics Command (USAECOM), as a result of the preliminary flight tests, requested the US Army Test and Evaluation Command (USATECOM) to conduct a product-improvement test of the new roll-axis calibration setting to determine suitability in both OV-1B and other OV-1 airplanes.

b. The AN/ASW-12(V) AFCS was modified by providing a new roll-axis calibration unit to replace the existing unit. This new unit was designed to improve the roll-axis characteristics of the AN/ASW-12(V) AFCS installed in OV-1B and OV-1C Airplanes. The AFCS is not normally installed in the OV-1A.

4. Description of Materiel. The new roll-axis calibration unit (hereafter referred to as the test unit) is designed to replace the present unit on the roll electro-mechanical rotary actuator used in the AN/ASW-12(V) AFCS. The test unit consists of resistors and capacitors which comprise the calibration network for the roll axis. The test unit is the same size and weight as the present roll-axis calibration unit.

5. Discussion. The OV-1B Airplane differs from other OV-1 airplanes in that the wing span is increased by six feet and the engines each provide an additional 145 horsepower. As a result of these changes, flight characteristics differ between the OV-1B and the OV-1A and OV-1C Airplanes.

6. Test Objectives. To determine:

a. Physical characteristics.

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- b. Improvement by the test unit of the roll-axis characteristics of the AN/ASW-12(V) AFCS installed in OV-1B and other OV-1 airplanes.
- c. Discrepancies introduced by the test unit in the operation of the AN/ASW-12(V) AFCS.
- d. Installation requirements for the test unit in OV-1B and other OV-1 airplanes equipped with the AN/ASW-12(V) AFCS.

7. Tests.

a. Scope. Test units were installed in the AN/ASW-12(V) AFCS in an OV-1B Airplane and an OV-1C Airplane. Each was operated approximately 20 hours during the period 9 December 1963 - 7 February 1964. The effects of the modification were determined at varying airspeeds from 80 knots to 270 knots and at altitudes to 22,000 feet. The operation of the modified AN/ASW-12(V) during both single-engine and normal operation was evaluated by eight pilots assigned to the USAAVNTBD.

b. Details of Test.

(1) Physical Characteristics. The test unit was weighed and measured. The following were determined:

(a) Dimensions: 1 5/8" x 2 9/11" x 1 11/16"

(b) Weight: 3.0 ounces

(2) Operational Characteristics. To determine the effects of the modification, the operational characteristics of the test unit were compared with those of the present roll-axis calibration unit by performing flight tests with each unit alternately connected to the AN/ASW-12(V) AFCS circuitry. Selection of the test unit or present unit was accomplished by a specially-installed toggle switch.

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(a) Roll-Response Rate. Roll-response rate was increased in both of the test airplanes in each of the functional modes of the AN/ASW-12(V) AFCS. The increase in roll-response rate improved airplane stability at all airspeeds. This improved roll stability was more noticeable at the lower airspeeds during both single-engine and normal operation.

(b) Roll Limits. The test units did not cause any change in the roll limits of the AN/ASW-12(V) AFCS in either airplane.

(c) Compatibility. The test unit did not introduce any discrepancies in the operation of the AFCS.

(d) Reliability and Ruggedness. No malfunctions occurred during the test period. Inspection of the test units indicated that they were sufficiently rugged.

(3) Installation and Maintenance Requirements.

(a) Installation. Installation of the test unit required approximately fifteen minutes for each airplane. The test unit was readily interchangeable with the present unit.

(b) Maintenance. No maintenance was required during the test period.

(c) Personnel. No additional training was required for an Aviation Electronic Equipment Repairman, MOS 284.2 to install or replace the test unit.

8. Conclusions.

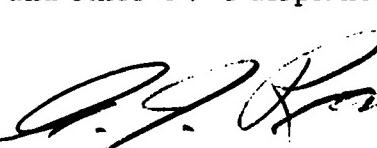
a. The new roll-axis calibration unit improves the operational characteristics of the AN/ASW-12(V) Automatic Flight Control System in both the OV-1B and other OV-1 airplanes.

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b. The new roll-axis calibration unit for the AN/ASW-12(V)
Automatic Flight Control System is suitable for use in OV-1B and
other OV-1 airplanes.

9. Recommendation. It is recommended that the new roll-axis
calibration unit be incorporated in the AN/ASW-12(V) Automatic
Flight Control Systems in OV-1B and other OV-1 airplanes.


A. J. RANKIN
Colonel, Armor
President

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